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STATEMENT

—OF—

MAJOR GENERAL WILLIAM CROZIER

"g.s."

CHIEF OF ORDNANCE, U. S. A.

—BEFORE THE—

SENATE COMMITTEE ON MILITARY AFFAIRS

DECEMBER 31, 1917

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ANDREW W. WALKER, WILLIAM M. ROXIER

CHIEF OF THE HOUSE

UNITED STATES

THE COMMITTEE ON MILITARY AFFAIRS

REPORT

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Statement of General William Crozier, Chief of Ordnance, U. S. A.,
Before the Senate Committee on Military Affairs on December 31, 1917.

It has been testified before your committee that the United States forces now in France are lacking in artillery and that such as they have has been supplied by the Allies, who can not afford the loss of a single piece, but who supplied it simply because the Americans had to have it, as their condition was worse than that of the Allies.

In the early part of last summer I concluded an arrangement with the French High Commissioner in Washington, Mr. André Tardieu, following an invitation from the Commission to place orders for artillery and artillery ammunition in France, for the manufacture of a considerable supply of 75 millimeter field guns and of 155 millimeter howitzers, for the American Forces in France. The supply ordered was more than sufficient to equip our troops with these pieces as rapidly as they would arrive in Europe, and the amount of ammunition for them was in accordance with the French practice, as developed by the war. The feeling of the French authorities in regard to this transaction is best expressed by the following notice for the French press, prepared by the High Commission in Washington, and handed me by Mr. Tardieu:

Washington, 14 Juillet, 1917.

Presidence Conseil,
Copie à Guerre-Armement.

Translation.

(Note for the French Press)

An important agreement has been concluded between the United States Government and the French High Commissioner, Monsieur André Tardieu.

According to said agreement the American Government adopts the two principal pieces of matériel of French artillery, the 75 millimeter field gun and the 155 millimeter rapid-fire howitzer.

The Expeditionary Corps of General Pershing has received from the French authorities, on arrival, its field artillery, its rapid-fire heavy artillery and its French artillery—which, of course, will accelerate its taking its place in the line.

At the same time the artillery production in France and in America has been organized so that the American Army of 1,000,000 men which is about to be recruited, will receive without delay, as the units are formed, the necessary heavy and light guns.

The negotiations taken up for the first time at the end of May, between Monsieur André Tardieu, French High Commissioner, Monsieur Ganne, Chief of War Munitions of the High Commission, and Brigadier General Crozier, Chief of Ordnance, were characterized by two ideas.

On one hand the American Government wished to adopt the quickest solution, in order to realize in the shortest time the complete armament of its forces.

On the other hand, with great foresight they attached particular importance to realizing, for the American and the French Armies, called to fight on the same battlefields, uniformity of munitions, of such capital importance from a tactical point of view.

In view of these two desired aims, the French High Commissioner was able, thanks to the development since 1916 of the machine equipment of our war munitions factories, to furnish General Crozier with a detailed plan of industrial collaboration, which by the united efforts of the French and American industries, will assure the complete realization of the American program.

The double certainty of rapid production and uniformity of munitions, decided the United States Government despite the incontestable value of its own matériel, especially that of the 3-inch field gun, of which the superior qualities are universally recognized, to adopt our 75 and our short 155.

The negotiations on these lines were rapidly completed; at the end of somewhat over one month, they were concluded this week by a complete understanding, fixing the quantity and the price of the matériel to be furnished.

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This understanding, susceptible of important further developments, is a precious proof of the esteem in which the most powerful industrial country of the world holds our engineers and our mechanical constructors. It has also a practical bearing of great value.

From the military point of view it is evident that uniformity of type of guns and munitions for armies fighting on the same battlefields, is an appreciable guarantee of safety and efficiency. The supply and the volume of fire are thereby equally facilitated. Unity results spontaneously from identity of weapons. Finally all tactical results, obtained by the experience of three years of war, are without previous adaptation, assimilated by the American Army.

From the industrial viewpoint, the unity of effort created between the manufacturing plants of the two countries, will produce happy results without precedent, not only during the war, but also subsequently. Common action provides the best means of mutual acquaintance and for preparation of the close co-operation which it is desired to organize for the future.

From the financial standpoint it is possible to hope that the purchase by the United States of French artillery matériel will create an improvement in exchange, which under the existing relations of America and her European Allies, is as much to be desired by the United States as by France.

It is also likely that the adoption of the metric system, which has been officially requested by the American Bureau of Standards and which is much to be desired from the point of view of future Franco-American interests, may be thereby facilitated.

These are, briefly stated, some of the results, certain or probable of the agreement between the French High Commissioner and the American Government.

The dominant note of the agreement lies in the proof it gives of the unshakable resolution of the American Government to achieve in the shortest time the maximum of military strength, and on the other hand it proves the intimate and active co-operation existing between the United States and France.

Mr. Baker, Secretary of War, and General Crozier, Chief of Ordnance of the American Government, have given proof in this case of the broadest spirit of comprehension and decision and have succeeded in a few weeks in securing for the American troops artillery of the first order.

Our High Commissioner at Washington speaks in unbounded praise of their co-operation with him.

We may add that the first French guns arrived last week in the United States and that the Artillery School of Saumur has been placed at the disposal of the American Army for training purposes.

(Prepared by Mr. André Tardieu, French High Commissioner, and handed to the Chief of Ordnance.)

Later I received the following letter from the French High Commission proposing to manufacture 155 millimeter guns, in addition to 155 millimeter howitzers, for the American Forces:

Washington, D. C., August 22, 1917.

*The High Commissioner of the French Republic in the United States.
To Brigadier General William Crozier, Chief of Ordnance, War Department, New York City.*

MY DEAR GENERAL: Confirming the conversation you had yesterday with Colonel Rémond and Captain de Jarny, I beg to inform you that I have received a cable from my Government stating that, at the request of General Pershing, the French Government have proposed the sale of forty-eight 155 mm. guns of Filloux type.

These guns will be delivered at the rate of one battalion (12 guns) per month for each month from September to December.

It will be possible to continue deliveries at the same rate after January 1, 1918, and probably to increase this proportion.

It should be noted that it will be difficult for the French Government to supply the necessary tractors and other motor vehicles entering into the composition of one battery of 155 mm. guns.

I note from verbal information received that your Government will be in a position to supply the necessary tractors in December, I am therefore cabling my Government, asking whether they can make the necessary arrangements to

provide caterpillar tractors and trucks corresponding to the batteries due in September, October and November.

I would greatly appreciate, my dear General, if you could let me know whether the United States Government are prepared to give me an order for the guns in question and under which conditions.

I beg to remain, my dear General,

Yours faithfully,

ANDRE TARDIEU.

And still later I received the following letter in regard to the delivery of 75 millimeter guns and 155 millimeter howitzers which had previously been ordered:

Washington, D. C., September 26, 1917.

*The High Commissioner of the French Republic in the United States,
To the Carriage Division, Office of the Chief of Ordnance, U. S. A., 1703 New York
Avenue N. W., Washington.*

SIR:

2. I wish also to confirm that, as per your request, 48 Schneider Howitzers will be ready for the 15th of October instead of 30, as originally provided.

Yours faithfully,

ANDRE TARDIEU.

The order for 155 millimeter guns was duly given and these pieces are now in the possession of our forces in France, and under manufacture for further delivery.

More recently, in the present month, the subject of the supply of the American Forces with artillery has been considered in conference by the highest authorities in France and England, and their decision as to the part to be played by European factories in a coordinated effort to utilize the productive abilities of the allied countries to the greatest advantage is expressed in the following extracts from a cablegram from General Bliss, Chief of Staff of the United States Army, who recently visited Europe:

CABLEGRAM

Received at the War Department December 5, 1917, 7:17 A. M. 1, CO. London.
The Adjutant General, Washington.

* * * in order to insure the equipment with artillery and ammunition of the American troops as fast as they arrive in France, the Minister of Munitions of France and England and Perskins, representing the United States, have exhaustively examined the situation and adopted the following resolutions for their respective governments:

The representatives of Great Britain and France state that their production of artillery (field, medium and heavy) is now established on so large a scale that they (are) able equip completely all American divisions as they arrive in France during the year 1918 with the best make of British and French guns and howitzers. * * * With a view therefore first to expedite and facilitate the equipment of the American armies in France and second to securing the maximum ultimate development of the ammunition supply with the minimum strain upon available tonnage, the representatives of Great Britain and France propose that the American field, medium, and heavy artillery be supplied during 1918 and as long after as may be found convenient from British and French gun factories. * * *

(Signed) BLISS.

I do not think that I need add anything to the evidence contained in these communications of the entire willingness of the French and English Governments to furnish us with artillery in much more complete supply than we shall have need for from them. The reason why artillery can be supplied in such quantity to our troops is that the manufacturing capacity of England and France had been greatly increased in order to provide the initial equipment in artillery to their largely increased armies, and also to meet the larger proportionate supply

of artillery which the early lessons of the war showed to be necessary. Having supplied these initial requirements the manufacturing capacity was much greater than necessary to make good wastage and was, therefore, and is available for the arming of our troops.

I am not excusing or trying to explain away the state of affairs under which we are dependent upon our Allies for the early supply of our troops with artillery and artillery ammunition. This condition ought not to have existed, but the responsibility for it must rest upon the whole country. In common with all other officers who were in a position to recommend, I have, in my annual reports and in my hearings before committees of Congress, persistently urged that better provision be made in appropriations, especially for field artillery and field artillery ammunition. I quote as follows from my hearing on the Fortification Bill, January 25, 1906:

GENERAL CROZIER: Let me explain to you what this appropriation will do, if you decide to make it. I am hoping to supply for use in war 250 batteries of guns of this class. * * * That will be at the rate of two guns per 1,000 men for an army of 500,000, which is a very moderate estimate. * * * Thus far there has been provided by appropriations * * * 69 of these batteries. * * * That will leave such a number to be provided that at the rate at which they are estimated for in this item, a supply will be completed in the year 1919. * * *

I would like to say, in connection with this item, that it is a very important one, because this matériel is of a class that can not be procured on short notice. It takes a great while to build these guns and to build the carriages and to get the ammunition for them.

(Same Bill, in the Senate, Feb. 27, 1906.)

THE CHAIRMAN: * * * The subcommittee had thought it unnecessary to have any hearings on the pending bill until they received your communication dealing mostly with the necessity for a reserve supply of ammunition. * * * The communication referred to is as follows:

War Department,
Office of the Chief of Ordnance,
Washington, Feb. 23, 1906.

The Secretary of War.

SIR: I have the honor to request that the attention of the Senate be invited to the following matters with reference to the bill (H. R. 14171) making appropriations for fortifications, etc., now pending before that body.

FIELD ARTILLERY

This Department is endeavoring to bring into existence a supply of 250 batteries, which is in the very moderate proportion of 2 guns per 1,000 men for an army of 500,000. The appropriation carried by lines 1 to 5 of the bill, added to an appropriation carried in the pending army bill for batteries for the militia, will permit the construction of 11 batteries. At this rate the procurement of the supply needed will be delayed until the year 1923, 70 batteries having been previously provided for.

* * * * *

Ammunition and mobile artillery are the items of matériel in which military preparation of the United States is now most behind.

Very respectfully,

WILLIAM CROZIER,
Brig. Gen., Chief of Ordnance, U. S. A.

* * * * *

Question: Kindly explain to us, General, the field artillery, where it is manufactured, and your recommendation therefor, why the appropriation was so largely reduced in the House; what motive influenced them there, and also your views relative not only to the necessity, but the policy of the Government continuing this work in the expectation of completing these guns and carriages.

GENERAL CROZIER: * * * The estimate which I submitted to the Secretary of War for this purpose called for about \$1,200,000. With that amount and with money amounting to about \$550,000 which is carried by the army appropriation bill for the purpose of procuring batteries for issue to the militia, I expected to

procure this field artillery at such a rate that the 250 batteries which I think are necessary would have been supplied by the year 1916. By direction of the Secretary of War I reduced the estimate from \$1,200,000 to \$600,000. That so increased the time necessary that the earliest date at which we would under it have been able to get our entire reserve would have been 1919. Now this estimate of \$600,000 has been further reduced by the bill as it has passed the House of Representatives to \$310,000. With this amount I shall be able to get only 3 batteries of field artillery, it not all being available for the purposes of field artillery, but the remainder going for other items which are mentioned in the bill. These 3 batteries, added to the 8 which are provided for in the army appropriation bill, will make 11 batteries, which are all I can manufacture during the coming year unless the appropriation is increased. Now, 70 batteries have already been provided for. 250 being required, 180 are left. 180 batteries at 11 batteries a year would require a time until about the year 1923 for their procurement. That is a plain statement of the case, gentlemen, and when I have made it you know as much about the subject as I do.

From my annual report for the fiscal year 1910:

SUPPLY OF MOBILE ARTILLERY

The supply of this matériel provided for to date is less adequate than that of any other class of fighting equipment. The types needed have been developed and some of each are under manufacture, but the appropriations do not permit of production in any considerable quantity. It is considered that in case of an emergency of any importance the field artillery equipment would be found to be insufficient, and it is consequently thought that the financial conditions which have rendered impossible the acquisition of a much larger reserve are unfortunate.

From my hearing on the Fortification Bill, Jan. 12, 1911:

Nothing is, perhaps, more striking than that as we make some progress it is impressed upon us how very slowly we are going, and how far we have yet to go. I think I have called it to the attention of the committee for several years past that as regards our preparation for war, we are worse off in this matter of field artillery than we are in anything else that we have, connected with the matériel. We are better off with reference to the seacoast armament; we are better off with reference to small arms; we are better off with reference to small-arms ammunition; we are better off with reference to personal equipment of the soldier and with reference to horse equipment for the cavalry, than we are with reference to this item of field artillery.

From my hearing on the Army Bill, March 11, 1912:

Question: It takes a long time to manufacture these field guns?

GENERAL CROZIER: Yes.

Question: How long does it take?

GENERAL CROZIER: I do not think that we could count on getting a battery delivered in less than a year from the time the order was given. I do not mean to say that it would take a year for each battery, but deliveries would not begin until a year after the order was given.

Question: It is very important to have them on hand?

GENERAL CROZIER: Yes; it is the slowest manufacture of any of the fighting matériel which we need.

From my hearing on the Fortification Bill, Jan. 15, 1912:

Question: What I am trying to get at is this: At what period of time would it be desirable, assuming that the army had to be recruited up to its strength for purposes of war, to have the guns to deliver?

GENERAL CROZIER: I should think that we ought to have them within a couple of months, under the present circumstances, of the time at which it is decided to put the army on its war footing. However, I think the circumstances ought to be such, and it is the duty of the Government to have them such that matériel would be needed in a fortnight.

Question: I appreciate that; but in the absence of that condition existing, is there any particular need of our advancing so rapidly in the supply of this matériel? You now have all the batteries that are needed by the Regular Army, with some reserve; you now have all the batteries and more than can be distributed among the militia, and the question necessarily arises, in connection with as large an item as this, as to the present need of supplying batteries in the amount requested.

GENERAL CROZIER: The Regular Army, of course, is such a small force that the fact of its being completely equipped with everything that it requires is one of no great moment, when you consider the force that ought to be equipped. The whole idea of preparation for war in this country is and ought to be the maintenance of a small force continually in the service and the rapid expansion of that force in time of war, which rapid expansion ought to be possible to be made with men who will already have had some training. Now, if we should ever arrive at that state, as I say, we would need this matériel. If there should be a state of confusion, lack of preparation, or absence of method by which the army could not be increased in size rapidly and effectively, I should not like to say how much we might be slack in one element to meet the slackness in others.

Question: The present army is more than sufficient in size for any offensive movement that we would ever contemplate?

GENERAL CROZIER: I do not think so, Mr. Chairman, by any means.

Question: Your idea of an army of 450,000 men is a defensive army of that size, is it not?

GENERAL CROZIER: Yes. But the number of troops that we could use offensively is very different from the army that we have now. Of course, I might go on and amplify that, but I could not tell you anything that you are probably not as well aware of as I am with regard to the possibility and necessity of using a larger force in any of the problems that may confront the country.

I might refer to the fact that I have been asking for a good deal more than I have gotten, because I have been trying to impress upon the committee that this class of matériel is that in regard to which our straits are greatest. We are better prepared to enter upon a war with respect to everything else that is to be supplied in the way of matériel than field artillery and field artillery ammunition. It is sometimes stated—irresponsibly, of course—that we never get through asking and that we always represent ourselves as in a deplorable condition.

From my annual report for the fiscal year 1913:

SUPPLY OF MOBILE ARTILLERY.

As stated in my last annual report, the supply of this class of equipment is less satisfactory than that of any other furnished by the Ordnance Department, except the ammunition for field artillery. The appropriations for the last two years for this purpose have been somewhat larger than for several years prior to that time, but it is hoped that still larger annual appropriations may be made, as even the present rate is not such as to provide a sufficient amount within a reasonable time.

No appropriation as large as \$3,000,000 was made for field artillery within the years since the Spanish War until the year 1916, when, in the Fortification Bill and in the Army Bill, passed respectively in July and August of that year, there was made available the sum of \$16,321,000. The extent to which this sum would go in providing artillery for an army of 1,000,000 men is illustrated by the sum which was appropriated for this purpose in 1917, including the Act of June 15th, which was \$171,900,000. The Act of October 6th appropriated for artillery \$225,000,000, but this provided for a larger force.

MACHINE GUNS

The greatly increased prominence which the European War has given to machine guns renders appropriate an examination of the recent history of this subject with reference to our own service. This class of weapon had been developed to a serviceable stage at the time of the Spanish-American War, but neither in that war, nor in the Boer War, nor in the Philippine insurrection, nor

in the Pekin Relief Expedition, nor in the Russo-Japanese War, nor in the Balkan Wars had it attracted anything like the attention which has resulted from its use in the European War. The Germans had apparently realized better than anyone else the value of machine guns in the kind of fighting which they expected to be engaged in and therefore supplied them to their troops in greater numbers than did the other powers. We, in common with many other civilized nations, had such an appreciation of the need for machine guns as was expressed in our establishing an allowance of about four per regiment, and a supply was accumulated at a very moderate rate corresponding to an annual appropriation of about \$150,000.

An appropriation of this amount was made in the Army Act of 1912, but before the consideration of the bill for the next year expressions of dissatisfaction with the rifle with which the service was then principally armed—the Benét-Mercié, otherwise known as the light Hotchkiss—had reached the ears of Congress. This dissatisfaction was, I believe, largely due to lack of proper instruction in the use of this class of weapon, and the belief upon the part of numbers of officers in the service that there was some other machine gun of such simple construction that no great amount of special instruction would be necessary for its use, which was a radical error. The Army Appropriation Act of June, 1913, therefore, instead of making an appropriation for machine guns, authorized the Secretary of War to contract for their construction to the extent of \$150,000, "if in his opinion it be for the interest of the service." This legislation reflected doubt in the mind of Congress as to a suitable service machine rifle, and threw upon the Secretary of War a more impressive burden than usual of responsibility for the type of machine rifle for which contracts might be made. Before urging upon the Secretary of War, therefore, the exercise of the authority which had, with some warning, been conferred upon him, the Ordnance Department joined in the dispositions for a competitive test of automatic machine rifles, which was begun in the autumn of 1913 and continued in the spring of 1914; the guns now most prominent among those which were tested being the Benét-Mercié, the Vickers, and the Lewis, which last gun has figured extensively in the expressions of dissatisfaction which have become common at the lack of sufficient equipment of machine guns, the point being urged in behalf of this gun that there is prejudice against it in the Ordnance Department, and that the Government has therefore been unwisely, if not wrongfully, deprived of a supply of this gun, which everybody now would be very glad to have. I think, therefore, that it is appropriate to especially set forth the experience of the United States Government with this gun.

The first offer of the Lewis gun to the Government of which there is any record, or of which I have any personal knowledge, was made to the Board of Ordnance and Fortification in a letter dated May 2, 1912, from the Automatic Arms Company, by the attorney for the company, Mr. R. M. Calfee (proceedings of the Board of Ordnance and Fortifications, dated May 2, 1912, signed by General Wood).

The Board considered this letter on June 6 and replied that it did not care to accept certain limitations upon the test which had been imposed in the letter offering the gun (proceedings of the Board of Ordnance and Fortification, dated June 6, 1912; signed by General Crozier).

On July 2, 1912, the Board considered a letter, dated July 1, from the Automatic Arms Company, requesting reconsideration of the board's action in regard to the test of the gun, and stated in its reply that "the Automatic Arms Company is informed that, after careful consideration of their letter, the board is of the opinion that the usual procedure should be followed, namely, the gun must be submitted to the test prescribed by the Ordnance Department. During this test the representatives of the company will be permitted to be present and preliminary to the test to give such exhibition of the performance of the gun as they may see fit, in the presence of the representative of the Ordnance Department charged with technical examination of the gun. After this demonstration is completed the gun will then be submitted to such tests as the Ordnance Department may deem necessary. Ammunition for such tests will be furnished by the Government.

"The parties representing the gun may have the privilege of declining to subject it to any portion of the test which may be proposed to which they may not wish to have it subjected at the time, but in respecting their wishes in this regard the report will, of course, state the facts.

"In the course of the complete test the gun will have the kind of field test which they desire, and copies of all reports in regard to the test will be furnished the company" (proceedings of the Board of Ordnance and Fortification, dated July 2, 1912; signed by General Wood). In this same summer of 1912, there was correspondence between the Chief Signal Officer and the Chief of Ordnance concerning the use of ammunition in contemplated tests of the Lewis gun with aeroplanes, in regard to which Colonel I. N. Lewis, U. S. Army, retired, has recently testified before your committee. This correspondence is as follows:

37819/392.

War Department,
Office of the Chief Signal Officer,
Washington, July 17, 1912.

Chief of Ordnance, United States Army.

SIR: I have the honor to state that it is contemplated trying the Lewis gun with the aeroplanes during the coming maneuvers to be held in the vicinity of New York, N. Y., in August next, and it is requested that 5,000 rounds of ammunition for the service rifle be issued to the Signal Corps for the purpose.

If it is considered necessary, reimbursement can be made by transfer of funds from appropriation "Signal Service of the Army, 1913."

Very respectfully,

GEORGE P. SCRIVEN.
Colonel, Signal Corps, U. S. Army, in charge of Office.

37819/396

War Department,
Office of the Chief of Ordnance,
Washington, July 27, 1912.

The Chief Signal Officer, U. S. Army.

SIR: 1. Replying to letter from your office, dated 17th instant (O.O. 37819/392), in regard to the supply of five thousand rounds of ammunition for the purpose of trying a Lewis gun with aeroplanes during the maneuvers to be held next month in the vicinity of New York City, I have the honor to inform you that this Department would not be authorized to supply ammunition for the trial of a gun not under test with reference to its adoption in the service, and that the representatives of the Lewis gun have not accepted the offer of the Board of Ordnance and Fortification to test their gun with reference to that object.

2. I will be glad, however, to furnish the Signal Department with an automatic rifle of the present service type, which weighs about 22 pounds; to fit it to an aeroplane, or to furnish the appliances for doing so, and to supply a suitable number of rounds of ammunition, without expense to the appropriations of the Signal Corps, for such test as you may desire to make with them.

3. Of course, this Department will be glad to furnish any number of rounds to the Signal Department, at the expense of the appropriations of your Department, without question as to the purpose for which you may desire them.

Respectfully,

WILLIAM CROZIER,
Brig. Gen., Chief of Ordnance, U. S. A.

The matter rested at this stage until March 5, 1913, when the Automatic Arms Company again offered a machine gun for test, pursuant to which a test was ordered on the recommendation of the Board of Ordnance and Fortification (proceedings of the Board of Ordnance and Fortification, dated March 6, 1913; signed by General Wood). A board of officers was, pursuant to the recommendation of the Board of Ordnance and Fortification, appointed by the War Department, to make a competitive test of all the automatic machine guns which should be submitted to it, the membership of the board consisting of Colonel Ernest Hinds, U. S. A.; Major W. G. Penfield, Ordnance Department; Captain W. R. Smedberg, Jr., Cavalry; Captain Frank S. Bowen, Infantry; and Lieutenant Austin N. Hardee, Infantry.

The board met at the Springfield Armory in September and tested seven different models of automatic machine guns. The Lewis gun submitted used American ammunition, but had been manufactured in England. At this test all of the competing guns were eliminated except the Benét-Mercié and the Vickers, and of these a field test was made in the spring of 1914, which resulted in the selection of the Vickers. Of the three guns that were the most prominent, the report of the board states that in the endurance test there were with the Lewis gun 206

jams and malfunctions; with the Vickers gun, 23; and with the Benét-Mercié, 59; the Lewis gun had 35 broken parts, while there were none for the Vickers and 7 for the Benét-Mercié; and the Lewis gun had 15 parts not broken but requiring replacement, as against none for the Vickers gun and none for the Benét-Mercié. The board reported that "The Lewis automatic machine rifle, as at present designed, is not superior to the service automatic machine rifle (Benét-Mercié) on account of the failure to maintain continuous fire, the large number of parts which were broken, and the large number of jams, many of the latter being reduced only after much difficulty and considerable time." The report also stated that "The board is of the opinion that, with the exception of the Vickers gun, none of the other guns submitted showed sufficiently marked superiority for the military service, in comparison with the service automatic machine rifle, to warrant further consideration of them in a field test."

During the course of the test the Army bill of 1914 was passed, and as no conclusion had been reached, the bill made no appropriation for this class of gun. At the time of the passage of the bill for the following year—1915—the Vickers gun had been adopted as the approved type and that bill therefore made an appropriation of \$150,000 for machine rifles and in addition reappropriated the unexpended balance of \$44,421.00, which had been left over from preceding appropriations at the time when the question of substituting a new machine rifle for the Benét-Mercié was taken up. Funds thus made available were used in making a contract for Vickers guns, which had been unanimously recommended by the testing board for adoption in replacement of the Benét-Mercié.

It is apparent that at this stage, the middle of the year 1915, there would have been no justification in expending the slender means at the disposal of the Department for procuring Lewis guns, in the face of the declaration of the board that they were inferior both to the Benét-Mercié guns already in service, and to the Vickers gun which had been recommended for adoption.

No Lewis gun was presented for a second test, after the first one in 1913, until April of 1916. This was understandable in view of the outbreak of the war in Europe, where the guns were being made, but in the latter part of 1915 their manufacture in this country for the forces of the British Empire was commenced, and the Ordnance Department then took the initiative in an effort to secure a second gun for test. In reply to request on the Savage Arms Company for such a gun, its Vice-President, Mr. W. G. Greene, wrote on September 30, 1915, as follows:

"At the present time we are not able to furnish your Department with a gun, having only two ourselves, both of which are in constant use at the factory, one as a manufacturing model, and the other as an experimental model. These two guns were both manufactured by the Birmingham Small Arms Plant. We will gladly demonstrate one of these guns if you care to send an officer." (O. O. file 472.5/25.)

Under date of December 28, 1915, Mr. Greene wrote:

"We acknowledge your letter of the 23d, in which you ask if we can furnish you with one Savage-Lewis machine gun. We are, of course, most anxious to furnish the Department not only with one Savage-Lewis gun, but with a considerable quantity, but at the present moment our output is all engaged, deliveries just now being due the Department of Militia and Defense at Ottawa, and we do not feel at liberty to divert even one gun from the contract deliveries." (O. O. file 472.5/55.)

In response to another effort of the Department, Mr. A. A. Borie, president of the Savage Arms Company, wrote under date of January 27, 1916:

"I regret to inform you that such a sale at the present time is impossible on account of other commitments made by this company. We trust, however, in the near future to be able to deliver a Lewis machine gun to the Department for the purpose of test by the Department, and will notify you in regard to this as soon as possible." (O. O. file 472.5/74.)

A test of the Lewis gun was finally held at the Springfield Armory in April of 1916. Two guns were tested, one using American and the other English ammunition. In regard to the gun using the American, or service, ammunition, the report of the board states:

"The service gun was withdrawn at this time by the Savage Arms Company (Mr. Borie and Mr. Wright, Colonel Dooley, Mr. Nelson and Mr. Renew being present), who stated that as the gun was in an experimental stage and as it was giving trouble both in feeding and in rupturing cartridges, which trouble it was thought would be overcome in a subsequent gun, they considered it useless to continue the test." (O. O. file 472.5/110.)

The board was composed of Captain W. R. Smedberg, Jr., of the Cavalry; Captain G. H. Stewart, of the Ordnance Department, and First Lieutenant Thomas W. Brown, of the Infantry. The board was created by a War Department Order, and submitted its report to the Adjutant General. It was not a board of the Ordnance Department, nor were any of the boards which dealt with the Lewis gun. They were all War Department boards, which contained only one Ordnance officer, and were not subject to the jurisdiction of the Chief of Ordnance.

In regard to the gun using British ammunition, the Board reported as follows:

Considering the performance of the Lewis gun in the test reported herein, and comparing that performance with the performance of the Vickers gun (Automatic Machine Gun, Model of 1915) and of the Springfield gun (Automatic Machine Rifle, caliber .30, model of 1909) in the test conducted by the board convened by Special Orders No. 191, War Department, August 16, 1913, the board finds that the Lewis gun in its present state of development is not equal or superior to either of the above mentioned guns. The Lewis gun is not as reliable or as dependable as are the other guns mentioned. The following table shows in summary the data upon which this opinion is based:

ENDURANCE TEST—15,000 ROUNDS

	Lewis	Springfield	Vickers
Time of firing, excluding cooling and repairing -----	2 hrs. 3 min.	2 hrs. 27 min.	1 hr. 24 min.
Number of jams and malfunctions-----	314	59	23
Number of broken parts-----	8	7	0
Number of parts not broken but replaced--	5	0	0

The Lewis gun on the other hand is lighter, simpler and has fewer number of parts than the other guns mentioned; and in the opinion of the board the question as to whether or not it can be developed to a satisfactory degree of reliability and dependability is an open one.

The board finds, therefore, that the results of the present test were not such as to justify the purchase of four Lewis guns chambered for the service ammunition for further test at this time, but in view of the desirable features of the gun, the board recommends that if the Savage Arms Company undertake to develop a gun for the service ammunition a further test be made, upon their request, after the development shall have been carried to a satisfactory stage. (O. O. file 472.5/110.)

It is thus seen that at this second test the board stated that the Lewis gun, even using British ammunition, was not as good as had been shown at the test of 1913 to be both the Benét-Mercié, which had been superseded, and the Vickers, which had been adopted; and that the gun using American ammunition had not been able to get through the test. There would, therefore, have been no justification for the investment of funds in Lewis guns, with two better types within the knowledge of the Department, even if there had been funds available for the purpose, which there were not. In regard to this test of the month of April, the President of the Savage Arms Company, which presented the guns, wrote the following letter, before the conclusion of the board was announced:

Executive Officer, Savage Arms Co.,
50 Church Street, New York, U. S. A.,

April 26, 1916.

General Wm. H. Crozier, the Chief of Ordnance, War Department, Washington, D. C.

SIR: This company wishes to express its appreciation to the Ordnance Department for the courtesies extended recently by the board appointed to inspect the operation of the Lewis machine gun. The company feels that the investiga-

tion has been entirely impartial and regards the board as one very capable of judging the value of the investigation to the Ordnance Department.

We also appreciate the courtesy shown us by Colonel Peirce and his assistants.

Respectfully,

Savage Arms Company,

A. E. BORIE, *President.*

(O. O. 472.5/124)

The next experience of the Ordnance Department with Lewis guns was in the summer of the same year—1916—when, pursuant to my recommendation, 353 of these guns were purchased from the Savage Arms Company, where they happened to be available from a number which had been made for the Canadian Government, for use on the Mexican border. The guns used British ammunition, a supply of which had to be purchased for them, and were the only ones which could be had. As funds were not available for the purchase of these guns, a deficit had to be created for the purpose; that is, they were purchased without authority of law. Unusual care was taken in establishing schools and furnishing experts to give instruction in the use of the guns before the soldiers were allowed to have them. Various reports were received as to their performance. The following is from an officer who was an instructor in one of the schools. It incloses a letter which had been written to the editor of the Army and Navy Journal, of New York, but which I did not forward to that paper. This inclosure I also present:

Camp Cotton, El Paso, Texas,

December 11, 1916.

General William Crozier, Chief of Ordnance, U. S. A., Washington, D. C.

MY DEAR GENERAL: From the privilege extended me while you were observing the machine gun instruction at Fort Bliss, Texas, some time since, I am addressing you in regard to the selection of the types of machine guns to be adopted and secured for our service.

The enclosed letter is written not in the nature of an expression of which type of automatic rifle is the better, only as the result of the comparison of the two as we have found them in our daily work.

This letter was addressed to the Army and Navy Journal requesting that it be published with no desire to get ourselves before the public, but solely through interest in this very important subject and with the hope that it may enlighten some who have not had the opportunity to witness such a comparison and test in field work.

It is requested that you have this article published or used in any way that you may deem advisable and best, or advise us, as we will not forward a copy to the Army and Navy Journal until advised by you.

We are intensely interested in the subject of machine guns and only wish that we had a chance to learn more of and work more with the various types of automatic rifles and machine guns, than can be had in our very interesting work here.

With kindest personal regards,

Very truly yours,

T. N. GIMPERLING,

Captain 34th Infantry.

El Paso, Texas, December 9, 1916.

NOTE: Not sent, Dec. 18, 1916.

To the Editor of the Army and Navy Journal, New York, N. Y.

SIR: In view of the present controversy over the selection of the type of automatic machine rifle to be adopted and bought for the army; as the machine gun board is now in session and as various articles are appearing in your columns on this subject, we request that you publish the following data, based on facts obtained from over three months of daily instruction in the handling and firing of these guns and in problems simulating active service conditions and requirements as nearly as can be obtained anywhere.

The two types of automatic machine rifles used were the Benét-Mercié and the Lewis gun. Factory experts of each type were present to keep their guns in the best possible condition.

The machine gun company of the 33d Michigan Infantry, 95 per cent of

whose personnel are general mechanical engineers and expert mechanics, is equipped with both the Benét-Mercié and the Lewis automatic rifles; this company has two Benét and four Lewis guns. The organization has received thorough instruction in the operation of both types of guns from experts direct from the Savage Arms Company (Lewis gun) and from the Springfield Armory (Benét-Mercié gun) and there is no reason to believe other than that these men are fully competent to assist in giving both types of gun a fair and impartial test.

We, therefore, believe we are safe in asserting, as both guns were in use side by side, that the comparative merits of these two types of gun, as efficient weapons, could be fairly judged.

This company has fired approximately forty thousand rounds of service ammunition with the Benét guns and approximately twenty-five thousand rounds of British .303 with the Lewis guns. These two Benét-Mercié guns have been in use for a period of about six years and have been in use at the School of Instruction at Sparta, Wisconsin. During this time they were in use by the machine gun companies of the Michigan National Guard for a period of three years; while the Lewis guns were issued to them in August of this year and were, therefore, new, as they were part of the Canadian shipment taken over by the U. S. Government from the Savage Arms Company.

In every case in which these guns have been fired side by side, the Benét-Mercié gun has proven its superiority. Many examples could be cited in support of this, one of which is as follows:

"Firing was maintained for one and one-half minutes for all six guns, with these results: one Benét gun fired 348 rounds with one jam; another fired 364 rounds with two jams. One Lewis gun fired 117 rounds with four jams; a second fired 87 shots with two jams; a third fired 44 rounds with five jams; and a fourth fired 9 rounds with one jam, which put this gun out of action."

This is but a fair example of the general results obtained by this company in the operation of the two types of gun.

The company has obtained as many as 546 rounds from one Benét gun in continuous firing without a jam. With the Lewis gun the best that they have obtained is the 117 rounds with two jams in one and one-half minutes, cited above.

It is our opinion that the parts of the Lewis gun are not properly finished and that they are made of a rather poor grade of matériel. The gun has a number of steel stamped parts, improperly heat-treated, which cause jams and a consequent inefficiency in the gun. As an example, the magazine is made of a very thin, flimsy steel stamping, toggled up with a combination of soft aluminum core and metal strips which are riveted on. This causes the magazine to be very vibrant and susceptible to the strain of feed pawl functioning. The ejector is made of a thin steel stamping, improperly heat-treated, and very often it bends, nearly always, batters on the end, through bolt action, in the course of eighty to one hundred and fifty rounds. The feed pawls, stop pawls and rebound pawls seem to be made of a poor grade of steel. The gas cylinder is made of a twenty gauge mill run steel, which has been found to be full of scale pits and imperfections. We believe that the gun, as at present constructed, could be made in lots of a thousand or more, at approximately fifty or fifty-five dollars per gun, for matériel and labor. It is now sold to the Government for a thousand dollars.

From the standpoint of mechanics, the Benét-Mercié gun is a masterpiece, inasmuch as the parts are finely finished and are made of excellent material and are properly treated where this is essential. The price at which the Government issues this gun is approximately \$412.00, which, it is believed, would net, to a private manufacturing concern, but a fair profit over the cost of production.

We are devoted to no type of gun, but are presenting these facts in the interest of the service.

DAVID O. BYARS,
1st Lieut. 34th U. S. Infantry,
On duty with Machine Gun Company.

T. N. GIMPERLING,
Captain, 34th U. S. Infantry,
Machine Gun Director, 11th Prov. Div.

ARTHUR C. CROSSMAN,
Captain, 33d Michigan Infantry, Comdg. Machine Gun Company,
Efficiency Engineer, Studebaker Corp.

MAXWELL H. SPREEN,
1st Sergt. Mach. Gun Co., 33d Mich. Inf.,
Asst. Chief Engr. Chevrolet Motor Car Co.

The School of Musketry submitted a report January 7, 1917 (O. O. 472.5-112/129), on efficiency of machine guns, showing extensive firings and careful consideration. The report stated as follows:

Thirteen Lewis guns were used in the firing. The guns were new. Except for some possible test firing not a shot had been fired from any of them prior to their use by this class. When they were received at the school it was found that several of the parts did not fit properly. This was true in particular of the joints between the barrel groups and the receiver groups. The other cases of misfit were due largely to poor workmanship and lack of finish.

When the firing of the guns began there was very little trouble with them that could not be accounted for by the fact that the personnel of the class was inexperienced and that about 3 per cent of the ammunition used was found to be faulty. After about 2,000 rounds had been fired from each gun, jams began to occur which were due to causes other than untrained personnel and defective ammunition.

By far the greater portion of jams due to defective mechanism were caused by the wear of the feed operating arms and stud, the bending of the cartridge guide, and the faulty construction and bending of the magazines; and of these about one-half were due to faulty magazines.

The total number of rounds fired from these 13 guns was 166,180. The maximum number fired from any one gun during any particular day was 2,992.

The following list shows the parts of these guns that were broken, damaged or lost during the course of the firing above noted:

Broken -----	57, including 13 bore cleaning rods
Worn -----	74, " 57 magazines.
Lost -----	162
Total -----	293

In their present condition these guns can not be depended upon to fire a single magazine without malfunctions. Whether or not they would operate with good magazines and with serviceable feed operating arms and studs remains to be seen when they are tested in this manner. At the present writing the spare parts with which to make such tests are not on hand.

The Lewis gun in its present state of development is not believed to be a satisfactory weapon for issue to our service as an automatic rifle or "first line gun."

The Lewis gun, while it is not a dependable weapon at present, is believed to possess great possibilities. Its lightness, the simplicity of its mechanism, the efficiency of its cooling system, and the ease with which men learn to use it (when it is new and working well), all tend to indicate that IF IT CAN BE MADE DEPENDABLE it will be an excellent first line gun.

This report was signed by Colonel R. M. Blatchford, Infantry, now a major-general in the National Army.

A number of reports were submitted by organization commanders in the Southern Department in regard to these guns, of which the general purpose is exhibited in the following letter from the Department Commander:

Southern Department,
Fort Sam Houston, Texas,
March 1, 1917.

From: Commanding General, Southern Department.
To: The Adjutant General of the Army.
Subject: Reports covering tests made of the Lewis machine guns and Benét-Mercié machine guns.

1. Herewith are the reports of the commanding officers of the machine gun companies of the 19th Infantry and the 37th Infantry covering comparative tests made of the Lewis machine gun and Benét-Mercié machine gun.

2. These reports are forwarded in connection with the 9th indorsement on A. G. O. file 2436783.

3. These reports are further evidence that in the extensive tests made in the Southern Department, the Lewis machine gun has failed to demonstrate its superiority over the Benét-Mercié gun in so far as its suitability for use with the machine gun organizations of infantry and cavalry regiments is concerned.

(Signed)

JOHN J. PERSHING,
Major General, Commanding.

In the meantime, in July, 1916, the same War Department board which had tested the Lewis gun in April, tested a Colt gun submitted by the Colt Patent Fire Arms Manufacturing Company, and reported as follows:

Considering the performance of the Colt gun in this test as compared with the performance of the Lewis gun chambered for British Mark VII ammunition, reported on by this board under date of April 25, 1916, the board finds that the Colt gun as submitted is superior to the Lewis gun for general service use. The Colt gun showed considerably greater reliability than the Lewis gun. The board finds, however, that for the particular case of use in aeroplanes, the lighter Lewis gun with its self-contained magazine is superior to the Colt gun, in spite of the former's greater liability to malfunction.

In connection with this report I recommended to the Adjutant General, under date of July 28, 1916, as follows:

FOURTH ENDORSEMENT

* * * * *

3. The 350 Lewis guns which have been purchased or ordered should be sufficient to afford the number necessary for the early needs of the aviation service. Therefore, in view of the reported superiority of the Colt gun for general service, I recommend that, to meet further emergency requirements which may arise, the purchase of either Colt or Lewis guns be authorized, depending upon promptness of delivery and other circumstances affecting the interests of the service.

4. It should be remarked that the Colt gun has not been presented by the manufacturers as their final solution of the machine gun question, but has been offered for examination and test with reference to the immediate needs of the Government.

Instructions given by the War Department on this recommendation were as follows:

FIFTH ENDORSEMENT

War Department, A. G. O., August 26, 1916. To the Chief of Ordnance, with the information that no machine guns of any description will be purchased by his office without securing the special authority of the Secretary of War prior to the purchase.

During all this time appropriations for the purchase of machine guns had been most meager, but the Army Appropriation Act approved August 29, 1916, carried a large appropriation of \$12,000,000 for these guns, and its judicious expenditure became a matter of great moment. The Secretary of War, therefore, on September 28, 1916, appointed a board with the following instructions:

The board will consider and make recommendations as to whether a single type or more than one type of machine rifle, using small-arms ammunition, is needed for the service, and the type or types which should be procured; and if more than one type, the proportion of the different types.

In making its recommendations the board will take into consideration the present supply of machine rifles of the various types; all reports of tests of machine rifles which may be believed to be serviceable in reaching a conclusion; the amount of funds now available for the procurement of machine rifles; the appropriations necessary to be made in order to complete the supply at an appropriate rate; and any records of the War Department, or of any branch of it, which it may desire to consult. If the board shall find that tests previously made are insufficient to enable it to reach a conclusion it will make recommendation as to further tests which ought to be made, their character, time and place.

The board will recommend the type of gun which should be procured in case of an emergency requiring an earlier supply, in possibly limited quantity, than can be had of the gun which it may consider as eventually the most suitable, if there be any of which earlier delivery may be possible; and whether contract should be entered into for a considerable supply of a gun of known type in advance of any test which it may conclude to be called for, and if so, to what extent.

The board will submit its report to the Adjutant General of the Army.

The membership of the board was selected with great care, in order to insure its expert and judicial character, and was as follows: Brigadier General Francis H. French, Colonel Joseph T. Dickman, 2d Cavalry; Colonel Tracy C. Dickson, U. S. Army, retired; Lieutenant Colonel Henry D. Todd, Jr., Coast Artillery Corps; Captain Robert H. Willis, Jr., Signal Corps; Lieutenant Steven C. Rowan, U. S. Navy; Captain Edward B. Cole, U. S. Marine Corps; Mr. Bascom Little, Cleveland, Ohio; and Mr. B. M. W. Hanson, Hartford, Conn. Their instructions required them in effect to cover the whole subject of the supply of machine guns including types. Mr. Hanson, an expert mechanical engineer, had at that time no connection with any machine gun interest, although he subsequently became a member of the staff of the Colt Patent Fire Arms Manufacturing Company.

On October 24, 1916, the board submitted a preliminary report in which it recommended among other things—

That tests heretofore made show that the Vickers machine rifle fulfills to a high degree the requirements of the military service for a machine rifle of the heavier type.

That previous tests and other information obtained by the board do not warrant its recommending at this time a rifle of the light type.

That available funds be used for immediate procurement of 4,600 Vickers machine rifles and 960 pack outfits for the same.

That further and competitive tests of machine rifles be conducted by the board at the Springfield Armory, Springfield, Mass., tests to begin May 1, 1917.

This report was approved by the Secretary of War on October 27, 1916.

Immediate action of the Ordnance Department in regard to procuring 4,600 Vickers machine guns was suspended by the War Department upon a protest by Mr. R. M. Calfee, of the Automatic Arms Company, representing the Lewis gun; and the machine gun board was reconvened. It submitted an additional report dated December 4, 1916, which confirmed its previous recommendations, with a statement that if it was desired to retain a certain amount of the funds then on hand for the purpose of insuring procurement of light machine guns after a test in May, such action should be had by reducing the number of guns which had been allowed for wastage.

The final conclusion reached by the War Department (contained in O.O. file 472.5-112/117) was that 4,000 Vickers machine guns with 960 pack outfits therefor, should be immediately procured; that \$1,560,000 should be held in reserve for the purchase of guns of such other types than the Vickers as the Secretary of War might decide upon after test, or such other use as might be decided by the Secretary.

The Adjutant General's Office on December 15, 1916, transmitted to the Ordnance Office final authority to proceed with the procurement of Vickers guns. On the following day, December 16, the order was placed and the contract executed and signed (A. G. O. file 2482640-E).

Such was the situation at the time when the imminence of war with Germany became apparent. All of the funds at the disposal of the Ordnance Department, except about \$1,500,000, had, by authority of the War Department, been utilized in placing a contract for machine guns of the type which had repeatedly been declared, by the most expert agencies which the War Department could create, to be the best in existence, and which had received emphatic and continuing indorsement in the European war. The remaining funds had been held for utilization in accordance with knowledge which might subsequently be acquired. If, up to this time, any considerable order had been placed for Lewis guns using American ammunition, the action would have been taken in the face of the failure of these guns ever to perform satisfactorily with American ammunition, and against the recommendation of every body of advisors upon which the War Department had called for counsel.

In view of the fact that Lewis guns were at this time rendering such service to the British forces as to justify their continuance as the standard machine gun of the light type for their army, the question arises as to why good Lewis guns were being made in England, and at the same time poor Lewis guns were being made in this country and urged upon the Government with great insistence.

On April 9th last, immediately after the outbreak of the war, I recommended that, as soon as funds should become available, which was expected to be almost immediately, orders should be given for 4,000 more Vickers guns, and for 2,500 Colt guns. The latter were recommended because it was practicable to secure them promptly and, although not of an adopted type, their immediate availability

called for their purchase as an additional number to those covered by the machine gun program. The Lewis gun had, through the winter and early spring, in the meantime been brought to a state of practicability for use with American ammunition, as shown by a test held under the auspices of the Navy Department, and witnessed by one of my officers, and, therefore, at the same time, and in anticipation of the test to be held in the month of May, I recommended that the \$1,500,000 at the disposal of the Department be invested in an order for Lewis guns, and that further authority to procure up to 5,000 of these guns be given, for utilization as soon as additional funds should become available. The funds already available were utilized in placing an order for 1,300 Lewis guns, which was done on April 12th. The 2,500 Colt guns were ordered on June 2d, using funds which were made available by the Army Appropriation Act of May 12, 1917. From the funds appropriated in the same Act, the Ordnance Department also ordered, on June 12th, 4,400 Lewis guns, at the same time informing the Savage Arms Company that additional orders might be expected. Two thousand additional were ordered on June 18th, three days after the passage of the first war appropriation measure, the appropriation Act of May 12th having been small, being the deferred Army appropriation bill which failed at the session before.

At the tests which were held in the month of May by the War Department machine gun board, in accordance with its program, the Lewis gun's performance was highly satisfactorily. In regard to it the board stated:

The mechanism of this gun has been under continual development since it was last tested by the War Department. * * * The Lewis machine rifle, caliber 30, fully established its character as a first-class machine gun. Many improvements have been made in this gun since it was last tested, which justify the delay of the War Department in according complete recognition to this weapon.

Following this report orders for Lewis guns have been given from time to time as funds have become available, up to the number of about 42,000, to produce which the company was first requested to increase its plant capacity to 2,000 per month, and afterwards to 3,750 per month, the arrangement providing for an expenditure of \$1,000,000 in the expansion of facilities to be taken care of properly in the price of the guns. As recent history shows, as soon as the Lewis gun was developed to the point of ability to properly perform with American ammunition, large orders were given for it, and the manufacturers were encouraged to expand their plant, the commencement of this action anticipating the report of the War Department board.

In regard to the Browning guns, the report states as follows:

* * * The board invites special attention to the tactical possibilities of the Colt automatic machine rifle, air-cooled, highly portable, designated above as the Browning air-cooled gun. According to reports received from observers, especially by Major L. T. Hillman, Ordnance Department, the drift of the French Army is decidedly towards greater use of automatic rifles of highly portable type, such as the Chauchat. In the British Army the Lewis gun is used in much the same way, but, on account of its weight and size, not with equal facility.

The report of the machine gun board further states in reference to the Browning water-cooled gun: "This gun developed such remarkable reliability of function during the firing of over 20,000 shots, that a further test of 20,000 shots was fired by the same gun for endurance. * * * *The only break was one sear after 39,500 shots;* this caused the only stoppage directly chargeable to the gun.

The report of the board of May, 1917, upon its receipt by the War Department, was sent to the War College Division, General Staff, and eventually reached the Ordnance Department on June 24, 1917, with the following letter from the Adjutant General:

There is inclosed herewith for your information and guidance, a copy of a General Staff Memorandum of June 20, and all papers in connection therewith.
* * *

Among the recommendations from the War College Division which were furnished in accordance with the above, for the guidance of the Ordnance Department, was the following:

That as soon as possible Browning light air-cooled automatic rifles be furnished to infantry at the rate of at least eight per company.

On July 28, 1917, the Chief of Ordnance caused the following cablegram to be sent to General Pershing (CMG 472.556/42):

Pershing, Amexforce, Paris.
Number 67.

Paragraph 4. About 20,000 Lewis machine guns chambered for United States ammunition as recommended by recent machine gun board are being secured for delivery before June 30, 1918. Deliveries begin in August. Will these guns be wanted? Deliveries of either type of Browning gun can not be expected in less than six to nine months. 4,000 Vickers guns should be delivered by December 31st. 2,500 Colt will be completed about September 15th.

(Signed) McCain.

In answer, General Pershing cabled as follows (CMG 472.55/91):

Date, August 5, 1917.

Number 9 N. Y.

O.O. 370.22/548.

From Paris.

To the Adjutant General, Washington.

Number 85.

With reference to paragraph 4 your 67, and in connection with paragraph 1 my 61, arrangements completed to equip first two divisions with Hotchkiss machine guns and Chauchat automatic rifles. Subsequent divisions should be equipped in same manner until Vickers machine guns and a successful automatic rifle is furnished by Ordnance Department. Information desired as to when incoming divisions may be expected to arrive with machine guns and automatic rifles so furnished, this information needed to determine what material should be obtained from French Government. Lewis machine gun more suitable as automatic rifle, but recommended as armament for aeroplanes in paragraph 9 my 44, July 16th. Recommended Lewis machine guns be used for aeroplanes accordingly.

(Signed) PERSHING.

General Pershing's cablegram of July 17, 1917, referred to above, stated:

* * * Suggest United States make every attempt to secure greatest possible production Vickers type per month. At least two Vickers guns on every aeroplane synchronized with engines and equal number Lewis guns unsynchronized with engine. We should anticipate use 3 Vickers synchronized guns and 3 Lewis unsynchronized on every aeroplane.

(Signed) PERSHING.

The large number of Lewis guns which were ordered were intended for use either in aeroplanes, or in advance of securing a supply of light Browning guns. on the ground; but the ability to secure from France machine guns of both light and heavy type sufficient for the armament of our forces until such time as light and heavy Browning or Vickers guns could be manufactured in this country, together with the appearance of an insistent demand for Lewis guns for the aviation service, dictated instructions to the Savage Arms Company to manufacture all guns still under order from them of the aviation type, except 2,500 for use in the instruction of troops in this country.

The development of the use for Lewis guns in the aviation service, in addition to the Vickers guns, will probably call for the continuous manufacture of the Lewis guns, instead of for the ultimate cessation of this manufacture which was contemplated for the time when a sufficient supply of light guns and heavy guns for the land service should make the use of an intermediate gun no longer necessary. About 200,000 machine guns of various types are now either on hand or under order, and with the providential assistance of the French, there is good prospect that our forces in France will not at any time be lacking in this weapon. The only possible way in which the resources of the Department could have been utilized to secure a greater supply of these guns would have been to use a larger proportion of the \$12,000,000 appropriated in the Act of August 9, 1916, for the purchase of Colt guns, instead of putting the money mostly into

Vickers guns, universally acknowledged to be a better type, but of which the delivery has been slower than was promised and anticipated, although they are now coming on in good numbers. To meet the demands of the aviation service 23,000 Marlin aircraft guns, in addition to Lewis and Vickers guns, have been ordered, and are under manufacture. I believe that this history shows that the wisest possible use has been made of the funds available, and the manufacturing facilities of the country, in providing the best available types of machine guns. As in the case of field artillery, there has been no way in which the long neglect to provide a proper supply of these weapons could be immediately made good, from our own resources, upon the outbreak of the war. As to the supply of our troops for training purposes in this country, there are now in their hands the following guns: At least 20 Lewis guns, 20 Colt guns, and 20 Chauchat guns for each camp and cantonment; a total of 2,500 Lewis, 2,500 Colt, and 2,200 Chauchat are in this country available for training purposes.

Testimony has been given before your committee in an effort to establish that the introduction of the Lewis gun into our service had been interfered with through prejudice upon the part of the Ordnance Department, and particularly upon the part of myself. This charge has been repeatedly made, and was the subject of widespread comment in the press in the autumn of 1916, in which comment it was treated in connection with the test of Lewis and Benét-Merciér guns which had been ordered by General Wood at Plattsburg, in the early summer of 1916. The charges have been accompanied by the statement that Colonel Lewis had offered his gun to the Government free of any charge for royalty. This matter of prejudice against the Lewis gun, and of refusal to accept the free offer of it, was made the subject of an investigation by the Inspector General of the Army, by direction of the Secretary of War. I will read his conclusions as they were summarized and approved for publication by the Secretary of War.

From the War Department.

December 18, 1916.

PRESS BULLETIN

At various times there have appeared charges and countercharges in the press with reference to the merits of the Lewis machine gun. The controversy reached the stage where open letters from high ranking Army officers were published. In order to settle authoritatively the technical question involved, a board was constituted, the report of which was recently made public. In addition the Inspector General of the Army was ordered to investigate the other aspects of the case. He has now done so, and his general conclusions are as follows:

There is no official record that Colonel Lewis ever offered a gun as his invention, through any individual or through the Board of Ordnance and Fortification, to the United States Government, free or at a price.

The first and only offer of the gun to the Government, of record, was made by a representative of the Automatic Arms Company, on September 2, 1913, to the Chief of Ordnance—one hundred guns complete, at not to exceed \$1,000 each, and to license the Ordnance Department to manufacture, use, and sell such guns in the United States for a royalty of not to exceed \$150 per gun.

Such tests as the Lewis gun has been subjected to have been under a program authorized by the Board of Ordnance and Fortification and approved by the Secretary of War, and were made by boards of officers named in orders from The Adjutant General's Office—one officer of the Ordnance Department on each board.

The Savage Arms Company, through its President, in a letter to the Chief of Ordnance with reference to the test conducted in April, 1916, stated: "The Company feels that the investigation has been entirely impartial and regards the board as one very capable of judging the value of the investigation to the Ordnance Department. We also appreciate the courtesy shown us by Colonel Peirce and his assistants."

The proceedings of the boards which tested the rifle have been, in each case, duly approved by the Secretary of War.

Whatever responsibility attaches to the condemnation of this gun, as a service gun, belongs to the War Department and not to the Chief of Ordnance nor to the Ordnance Department.

The controversy over the Plattsburg test arose through the fact that the owners of the Lewis gun had previously submitted it for two tests to boards convened by the War Department, under a program approved by the Board of Ordnance and Fortification, and it had failed to pass what is known as the arsenal

or endurance test, thereby losing its right to the field test proposed by the program of the Board of Ordnance and Fortification, or to any test not authorized by the War Department.

The records do not show any hostility on the part of General Crozier or the Ordnance Department to the Lewis gun, but do show that the Department, by direction of its chief, afforded the owners of this gun every reasonable facility in placing it before the testing board at the Springfield Armory.

The controversy which has arisen does not involve questions of fact, merely the value of opinion as to the character of test to which this gun was subjected at Plattsburg.

The Secretary of War has approved these conclusions of the Inspector General and, in accordance with the latter's recommendation, has directed the controversy to cease. (O. O. file 472.5/494-Lewis.)

Colonel Lewis has stated that he has offered other inventions to the Government free of charge, and has referred particularly to range finders, of which he has stated that I opposed the adoption. I have never opposed the adoption of his range finders, and in regard to their free offer I submit the following from a letter from Colonel Lewis to the Board of Ordnance and Fortification, dated May 4, 1896 (O. O. file 4613-Enc. 48), in regard to a certain dial telegraph:

Board on Regulation of Seacoast Artillery Fire.

Fort Wadsworth, N. Y., May 4, 1896.

*To the Board of Ordnance and Fortification,
Fort Monroe, Va.*

GENTLEMEN:

* * * * *
I would like to state further, that my only desire in bringing this telegraph before you is to aid in securing for our service the very best of each kind of instrument and device that we must necessarily use. In case you accept it, it becomes the property of the War Department absolutely and without condition so far as every military use is concerned, and the same is true not only of this, but of every instrument or device that I may at any time submit to you.

I am, gentlemen,

Very respectfully,

Your obedient servant,

I. N. LEWIS,

1st Lieut., 2d Art.

The paragraph above quoted is the only one which is here pertinent. This paragraph indicates what Colonel Lewis would like to have understood as his attitude in regard to the use of his inventions by the Government. The instrument to which this particular letter relates never came into extensive use, and was never purchased in quantity by the Ordnance Department, but a range finder invented by Colonel Lewis did come into use, and was perfected with the aid of funds allotted by the Government. Allotments in connection with the development of his range finder were as follows:

August 1890, \$2,885.00 (O. O. file 4973/1890).

September 22, 1890, \$200.00 (O. O. file 6619/01).

May 3, 1892, \$3,000.00 (O. O. file 2345/92).

January 24, 1893, \$95.00 (O. O. file 606/93).

September 6, 1893, \$250.00 (O. O. file 706-B/93).

On letter of September 29, 1894, \$44.75 (O. O. file 4613-Enc.83).

November 20, 1894, \$2,000 (O. O. file 4613-Enc. 88), increased later by \$500 (O. O. file 4613-Enc. 2).

October, 1895, \$550.00 (O. O. file 4613 Encs. 7 and 8).

On November 23, 1896, Colonel Lewis, then Lieutenant Lewis, addressed the following letter to The Adjutant General:

4613 Enc. 83)

Fort Wadsworth, N. Y. H., Nov. 23, 1896.

To the Adjutant General, U. S. Army, Washington, D. C.

SIR: I have the honor to respectfully submit for the consideration of the Secretary of War, and for such action as he may deem proper, the following with respect to my range and position finder:

The fact is well known to the Department that during the past eight years

I have developed practically and invented a range and position finder for seacoast artillery use which has been subjected to the most thorough service tests for a period of more than three years, and which, as the result of those tests has been officially adopted by the Board of Ordnance and Fortification as the service range finder for U. S. Artillery with the recommendation that the necessary steps be taken to acquire the right to use this instrument upon such terms or at such a rate of compensation as may to the Secretary of War seem just and equitable.

The result of the tests made shows that not only does the instrument meet every requirement of a modern artillery service in the most satisfactory manner, but that it is also the most reliable and accurate of its kind in the world today. There is, in fact, no other instrument of American origin that even approximately fulfills service requirements.

Believing, as I do, that it forms a most important element in the artillery defence of our coasts, I want my own Government to have the first opportunity to purchase my rights in the invention and I wish to dispose of those rights on terms that are fair and equitable.

I own absolutely in my own name all the rights, and have never at any time parted either directly or indirectly with the whole or any part of the invention; I am therefore in a position to assign all patent and other rights, to turn over all the confidential data of construction, and to furnish complete working drawings to the Government in case of purchase.

I would respectfully submit the following distinct propositions which I believe to be fair and reasonable, viz.:

1st. I will sell all rights in the invention for the United States alone, leaving me free to negotiate for the sale of the rights for foreign countries, for the sum of fifty thousand dollars (\$50,000):

2d. I will sell all rights in the invention absolutely and exclusively for the sum of seventy-five thousand dollars (\$75,000).

Inasmuch as I have already waited long and patiently for the Department to take some definite action in regard to the purchase of my invention, and in view of the fact that I have already had overtures from two foreign governments, and a direct offer of purchase for the rights from a well established and thoroughly reputable American company, I would respectfully ask to be informed as soon as possible of the decision of the Secretary of War.

I am, General,

Very respectfully,

Your obedient servant,

I. N. LEWIS,

1st Lieut. 2d U. S. Art.

The offer was not accepted.

On February 1, 1897, the Honorable J. R. Hawley, Chairman of the Senate Committee on Military Affairs, addressed the following letter to the Secretary of War:

4613 Enc. 88)

United States Senate,

Washington, February 1, 1897.

DEAR SIR: Senator Chandler offers an amendment to be proposed to the Fortifications Appropriation Bill, appropriating \$100,000 for the purchase of all rights in the Lewis range finder. The proposed amendment was referred to the Committee on Coast Defenses, of which I am Acting Chairman, in the absence of Senator Squire.

So far as I have canvassed the committee all are in favor of it except one, and he makes a suggestion which I submit to the Department. This gentleman has visited Sandy Hook and seen the range finder tested and admired it; but he says that great ingenuity is being exercised in that direction and in view of the possibility that some better range finder may be found we ought to authorize the War Department to buy ten, twenty, thirty, or forty range finders, as they may be needed, and wait a while, and ultimately, if it be necessary and nothing better is discovered, buy the patent.

I shall be glad of some expression from the War Department or the Ordnance Bureau on this criticism. I think the Committee is disposed to report the amendment favorably.

Yours truly,

HON. D. S. LAMONT,

J. R. HAWLEY.

Secretary of War.

P. S.—If a note can be mailed to me this afternoon I should be glad to get it in the morning.

The letter was answered by General Flagler, then Chief of Ordnance, on the next day, as follows:

4613 Enc. 88)

Office of the Chief of Ordnance,
Washington, D. C., February 2, 1897.

Hon. Jos. R. Hawley, U. S. Senate, Washington, D. C.

SIR: Your letter of the 1st instant, addressed to the Secretary of War, in regard to the Lewis range finder, has been referred to me for reply.

This department has purchased a limited number of the Lewis range finders, and in accordance with the recommendations of boards that investigated the matter, has issued these range finders to posts for actual trial in service. Unless an extraordinary emergency should arise it is not the intention to purchase more range finders until those in use have been tried. In the meantime other range finders are under consideration, it is not impossible that a better range finder may be obtained, and under all the circumstances it would not, in my judgment, be wise for the United States to incur the expense of purchasing all rights in the Lewis range finder.

Respectfully,

(Signed) D. W. FLAGLER.
Brig. Gen., Chief of Ordnance.

On March 15, an order for 100 Lewis range finders at a cost of \$1,500 each, was given (O.O. file 4613 Enc. 140).

CHECK FOR ROYALTIES

Colonel Lewis has testified before you in regard to a check sent by him to the Secretary of War, giving to the Government royalties which he had received in connection with the purchase by the United States of Lewis guns. Following is the correspondence upon that subject:

072.4/62-Inc.3)

1 Russel Terrace, Montclair, N. J.
February 16, 1917.

*The Honorable the Secretary of War,
Washington, D. C.*

SIR: Since my return from abroad on the 1st instant I have received a complete statement of moneys due and paid to me during the year ended December 31st, 1916, by the Savage Arms Company, of Utica, N. Y., as royalties on the American manufacture of Lewis guns, spare parts and accessories.

Included in the statement referred to is the sum of ten thousand eight hundred and eighty-nine dollars and seventeen cents paid to me as royalties on three hundred and fifty-three Lewis guns (with spare parts) manufactured originally under contract with the Canadian Government but actually delivered to and paid for by the United States War Department.

During our personal interview in your office in June, 1916, about the time of the delivery of these three hundred and fifty-three guns, I informed you that I had repeatedly offered my interest in my machine gun invention to my own Government, without thought of pecuniary recompense, long before undertaking the development and introduction of the gun abroad; notwithstanding the fact that I had never received the lightest assistance or encouragement in the practical development of my inventions from anyone connected with the United States Ordnance Department.

I feel a moral obligation to refuse to profit to the extent of one penny from the sale of the above-mentioned guns to the War Department, and I therefore enclose herewith my certified check on the Corn Exchange Bank of New York, payable to your order, for ten thousand eight hundred and eighty-nine dollars and seventeen cents, with the request that you deposit the same to the credit of the United States Government.

Very respectfully, your obedient servant,

ISAAC N. LEWIS,
Colonel, U. S. Army (retired)

Treasury Department,
Washington, April 14, 1917.

MY DEAR MR. SECRETARY: Referring to your letter of March 2nd, with which you transmit a check of Isaac N. Lewis, in the sum of \$10,889.17, drawn to the order of the Secretary of War and by you endorsed to the Secretary of the Treasury, it is noted that Isaac N. Lewis, the drawer of the check, is a retired officer of the United States Army and the inventor of a machine gun; that the gun is manufactured by the Savage Arms Company and that Lewis receives a royalty therefrom; that the sum of \$10,889.17 represents the royalty received from Lewis from the said company for the sale of the guns in question to the War Department; and that Lewis feels a moral obligation to refuse to profit to the extent of one penny from the sale of the guns to the Government, and for that reason transmits the check representing the amount of the profit with the request that it be deposited to the credit of the United States Government.

The amount tendered and offered by Lewis appears to be offered as a gift or donation on his part to the United States, and as it is apparently offered without any condition or qualification whatever, the same may be legally accepted.

However, as it appears from your letter of March 2nd that the Savage Arms Company, the corporation which paid the royalties to Colonel Lewis, is constantly competing for orders before your Department, in the last analysis the question of accepting this donation would seem to be a proper one for the War Department to determine.

The correspondence and certified check are returned herewith.

Very truly yours,
W. G. McAdoo,
Secretary.

To Honorable,
The Secretary of War.

072.4/62)

War Department,
April 18, 1917.

Memorandum for the Chief of Ordnance:

Subject: Letter from Secretary of the Treasury, April 14, returning check for \$10,889.17 from Colonel Isaac N. Lewis.

Will General Crozier kindly give me his opinion in the matter of the acceptance of the inclosed gift? I am inclined to request the Secretary of the Treasury to deposit this fund to the credit of the United States as a gift, and yet I do not want to embarrass the Ordnance Department in its dealings with the Savage Arms Company.

BAKER,
Secretary of War.

072.4/68)

Office of the Chief of Ordnance,
Washington, April 24, 1917.

Memorandum for the Secretary of War:

Subject: Acceptance of check from Colonel Lewis covering royalties on machine guns.

I do not think that the acceptance of this check would embarrass the Ordnance Department in its dealings with the Savage Arms Company with reference to the Lewis gun. If Colonel Lewis wishes to treat further purchases made and to be made of Lewis guns from the Savage Arms Company in a similar manner and shall notify the War Department of his intention, the resulting advantage in cost to the Government of the Lewis gun must be considered when negotiations for machine guns of like character are under way. If he shall not give any such notice of intention, nor transfer to the United States his right to royalties on guns manufactured for the United States, the price at which guns may be offered by the Savage Arms Company will, of course, be considered at the figure which the company gives.

There are, however, some other features accompanying the offer of this check by Colonel Lewis which I think should be taken into consideration in reaching a

conclusion as to its acceptance. In his accompanying letter dated February 16, 1917, he states to the Secretary of War:

"I informed you that I had repeatedly offered my interest in my machine gun inventions to my own government, without thought of pecuniary recompense, long before undertaking the development and introduction of the gun abroad;"

Colonel Lewis never offered either to this Department or to the Board of Ordnance and Fortification, which are the agencies established for the consideration of the machine gun supply of the United States, his interest in his machine gun inventions. There is no record of any such offer as he claims to have made, and the first gun which he presented to either the Ordnance Department or the Board of Ordnance and Fortification was offered for consideration as a commercial matter, and had itself been manufactured abroad.

He further states in his letter inclosing his check:

"I have never received the slightest assistance or encouragement in the practical development of my inventions from any one connected with the United States Ordnance Department."

Colonel Lewis never asked the assistance of the Ordnance Department in the development of his inventions. If the inventions had been developed with the aid of the United States Government Colonel Lewis would have lost the right to royalties for their use by the Government. The Government has tested several of his inventions quite extensively, at considerable expense, and the tests were probably useful in the development of the inventions; but it has done as much for many other inventors. The Act of June 25, 1910, giving additional protection to owners of patents of the United States grants the right of suit against the United States for compensation for the use of inventions, and provides further—

"That the benefits of this Act shall not inure to anybody who, when he makes such claim, is in the employment or service of the Government of the United States, or the assignee of any such patent; nor shall this Act apply to any device discovered or invented by such employee during the time of his employment or service."

Colonel Lewis further states:

"I feel a moral obligation to refuse to profit to the extent of one penny from the sale of the above mentioned guns to the War Department."

The Ordnance Department has made considerable purchases of two other articles invented by Colonel Lewis, namely, range finders, aggregating in cost something like \$350,000. These articles, like the machine gun, were invented by Colonel Lewis while in active service in the Coast Artillery. His range finders have been purchased from private parties, and the Government has been given no advantage, in purchase price or otherwise, by reason of the range finders having been invented and patented by Colonel Lewis. In connection with the development of the first there were allotted by the Board of Ordnance and Fortification sums aggregating approximately \$10,000.

I think that the effect of the acceptance of Colonel Lewis' check in operating as an endorsement of his statements and position in regard to the use of his inventions by the Government should be taken into consideration in determining whether or not it should be accepted, if any discretion exists in the matter.

(Signed) WILLIAM CROZIER,

Brig. Gen., Chief of Ordnance, U. S. A.

072.4/70)

War Department,
Washington, D. C., April 29, 1917.

MY DEAR COLONEL LEWIS:

On February 16th you wrote me a letter and sent me a certified check on the Corn Exchange Bank of New York for \$10,889.17, with request that I deposit same to the credit of the Government of the United States.

In your letter you state that this sum was the amount received by you from royalties on three hundred and fifty-three Lewis machine guns with spare

parts manufactured largely under contract with the Canadian Government but actually delivered to, and paid for by, the United States Government through the War Department. In my office in June, 1916, you informed me that you had repeatedly offered your interest in your machine gun inventions to the Government of the United States without thought of pecuniary recompense, and that you felt a moral obligation to refuse to profit to the extent of one penny on the sale of such guns to the War Department.

In view of the fact that your letter contains several statements which have from time to time been the basis of controversy I deem it wise to hand you herewith copy of memorandum from the Chief of Ordnance, to whom I referred the question of accepting this check, and also as to whether its acceptance would embarrass the Ordnance Department in subsequent dealings with the Savage Arms Company in purchasing further supplies for the Lewis gun.

I do not send you the attached memorandum to invite further comment on the controversial portions either of your letter or that of the Chief of Ordnance, but merely to have it understood that the acceptance of this check by the Government is not to be considered as a determination by me of any of these ancient matters of controversy.

If you do care to have this money deposited in the Treasury of the United States simply on the ground stated in your original letter and without understanding that I am now examining or undertaking to determine any controversial question as to the breach of relations between you and the War Department, or any branch or division of it, I shall of course be glad to accept the check on behalf of the Government.

I shall hold the check until I have your reply.

I ask your particular attention to the suggestion made by General Crozier with regard to the purchase of certain Lewis guns from the Savage Arms Company, in order that this department may be advised in undertaking future purchases.

Very sincerely yours,

NEWTON D. BAKER,
Secretary of War.

COLONEL ISAAC N. LEWIS,
1 Russell Terrace,
Montclair, N. J.

072.4/73)

No. 1 Russell Terrace, Montclair, N. J.,
May 12, 1917.

*The Honorable the Secretary of War,
Washington, D. C.*

MY DEAR MR. SECRETARY: Your letter of April 29th, with its enclosed memorandum from the Chief of Ordnance, has been received and very carefully considered.

I do care to have the money represented by the check sent you in my letter of February 16th, 1917, deposited in the Treasury of the United States simply on the ground stated in my original letter, without any understanding that you are now examining or undertaking to determine any controversial question as to the breach of relations between me and the War Department, or any branch or division of it, and I now have the honor to request again that you so accept and deposit it.

My letter of February 16, 1917, was sent you solely for the reason stated therein, and for no other.

I can see no possible embarrassment to the War Department nor to the Ordnance Department, in the acceptance of my check. It is possible, however, that your acceptance and deposit of the check may embarrass the present Chief of Ordnance personally.

The memorandum from the Chief of Ordnance to which you invited my attention is so widely at variance with what I know from personal knowledge to be the facts in the case, that I cannot fairly consider any of the questions raised by General Crozier therein without controversy, and I understand it to be your wish and direction that there be no further controversy.

In the present very grave national emergency, I am directly instrumental in supplying, delivering and putting on the actual firing lines against the fighting enemies of my country more machine guns each week than the present Chief of

Ordnance has supplies for the use of our own army of defense during the whole of the 14 years that he has been in office. I have done, and am doing, this without one penny of assistance and without one word of encouragement or acknowledgment from any one connected with the Ordnance Department, and in spite of the long continued and active opposition of that Department.

I am therefore content to now rest the matter with you simply as a personal appeal for justice.

Very respectfully,
Your obedient servant,
(Signed) I. N. LEWIS,
Colonel, U. S. Army, Retired.

072.4/86)

Office of the Chief of Ordnance,
War Department, June 4, 1917.

Memorandum for the Secretary of War:

Subject: Acceptance and deposit of check from Colonel Lewis returning royalties.

I do not see any objection to the acceptance and deposit of Colonel Lewis' check for \$10,889.17, in accordance with the letter of May 12, 1917 (O. O. file 072.4/73), in reply to one from the Secretary of War of April 29th (O. O. file 072.4/70), in view of the reservations made in the last mentioned letter concerning the determination of the matters in controversy.

(Signed) WILLIAM CROZIER,
Brig. Gen., Chief of Ordnance, U. S. A.

072.4/92)

Treasury Department,
Washington, June 18, 1917.

MY DEAR MR. SECRETARY: I have the honor to acknowledge the receipt of your letter dated 7th instant, with its enclosures, including check No. Special 692, drawn February 16, 1917, by Isaac N. Lewis, on the Corn Exchange Bank, New York, in your favor for \$10,899.17, endorsed by you to the order of the Secretary of the Treasury.

The check has been collected and, as requested, its amount has been deposited in the United States Treasury in the name of Isaac N. Lewis, Colonel U. S. Army, retired, on account of "Donation to the Government," as shown by enclosed duplicate certificate of deposit No. 6802 issued therefor on June 15 by the Treasurer of the United States.

The correspondence which accompanied your letter is herewith returned for the files of your Department.

Respectfully,
(Signed) OSCAR T. CROSBY,
Assistant Secretary.

The Honorable the Secretary of War.

MACHINE GUNS FROM FRANCE

With regard to the assistance which the United States forces in Europe will receive, in the supply of machine guns, from the French Government, the following is quoted from a letter from the French High Commissioner in Washington to the Chief of Ordnance, dated September 7, 1917 (CMG 472.583/3):

"My Government has also proposed to General Pershing for the next ten divisions sent to France, 2,600 machine guns, thus making a total of 3,340 Hotchkiss machine guns firing the French ammunition.

"Of these 3,340 machine guns, 2,600, about, are to be delivered before the 1st of January, 1918.

* * * * *

"As you can see, the French Government is in a position to fulfill all requirements of the United States Expeditionary Forces abroad, so far as heavy machine guns are concerned."

And from a letter from the same to the same, dated Dec. 5, 1917 (CMG 472.574/8), in regard to the manufacture of the light type of machine gun or automatic rifle:

"I beg to state that I am informed by my Government that the factory manufacturing the 25,000 Chauchat rifles for the American Army expects to have the whole lot completed about March, 1918.

"Under these conditions, I am directed to ask you whether you will be prepared to place a further order and what will be the importance of this order. This information is necessary to plan out the output of the factories concerned for 1918."

Between August, 1916, when funds to any significant amount first became available, and July, 1917, orders were placed in the United States for 14,200 machine guns and automatic machine rifles, and since the latter date there have been placed orders for these weapons to the number of over 186,000, of which about 39,000 have been ordered in France.

One witness has testified that his offer to take an order for machine guns, in February last, was received in my office with the statement that the Department was not interested. At that time all the funds at the disposal of the Department had been obligated under a contract for Vickers guns, except about \$1,500,000, which were being held to await the conclusions from the test to be held in the following May. Under these circumstances it was not practicable to place any orders for Colt guns, the kind offered, nor to create an obligation which the Government would have to meet, especially as the Colt gun was one which was passing out of use. 2,500 of these guns were subsequently bought for a stop-gap, but they have not been requested by General Pershing, although they have been offered him. Later on, during the summer, new emergency needs for the aviation service were presented to the Department, and orders for 23,000 modified Colt guns, known as the "Marlin Aircraft," were placed.

In the matter of price, Mr. Soddard, the witness referred to, is reported to have said that he offered to sell Colt machine guns to the Department for \$500 each, but that it was turned down and since, under orders placed, the contract cost was twice that sum. On December 5, 1916 (O.O. 472.5-112/102) a letter was signed by Edgar Park, Vice President of the Marlin Arms Company, which stated:

"At this writing we are in a position to tender to the Government of the United States (and so far as I can foresee, our position should not change prior to December 14, 1916), Colt automatic machine guns, .30 caliber, manufactured by us, to the extent of 5,000 (but preferably not less than 3,000) for delivery prior to March 15, 1917, at the price of \$650 each."

On March 25, 1917 (O. O. file 472.5/48), a telegram was received from the Marlin Arms Corporation, in part as follows:

"We can deliver 10,000 guns within 120 days from signing of contract and 5,000 per month thereafter. Prices on record in your department."

On May 10, 1917 (O. O. file 472.52/63), the Marlin Arms Corporation, by A. F. Rockwell, its president, stated:

"If we receive an order for 2,400 Colt automatic machine guns, we will reduce our list price from \$650 per gun to \$600 per gun. * * * The above mentioned prices include the tripods and ordinary spare parts."

The contract for 2,500 guns was at a price of \$600 each.

The contract of September 25, 1917, between this Department and the Marlin-Rockwell Corporation for 23,000 aircraft guns is at a price of \$278.80 each. For comparison with the prices referred to above, there should be added for tripods and spare parts which were not included in the contract, the sum of about \$158.85, making a total of \$437.65.

No record can be found of other offers than those quoted above.

RIFLES

You have heard a good deal of testimony as to the wisdom of manufacturing the Enfield rifles to take the United States ammunition, instead of continuing their manufacture for English ammunition, which was already under way in this country. I will not detain you with any further statement upon that point, but I do wish to speak of some testimony which has been given you to the effect that the Ordnance Department went too far in its requirement for interchangeability as between the rifles manufactured at the three separate plants where they are being produced, and required a greater degree of interchangeability than was worth the delay involved. I wish to say that we have not yet complete interchangeability in these rifles, and have not attempted to get it. I will give you an illustration. The striker, upon the front end of which is formed the firing pin for firing the primer of the cartridge, is assembled to what is called the cocking piece; this is then assembled to the bolt and the bolt itself fits into the receiver of the rifle. In assembling the striker in the bolt there are necessary tolerances in the dimensions of the parts which are fitted together. If a set of these parts happen to be used together in which the maximum allowed tolerances are all on the same side of the prescribed dimension, the effect will be that the point of the firing pin will protrude about 0.028 of an inch too far beyond the front of the bolt, with the result that there will be danger of piercing the primer in firing the gun, and of producing a blowback of powder gases into the mechanism about the bolt. If an attempt should be made to correct this by manufacturing the strikers 0.028 of an inch shorter than the prescribed dimension, so that there would be no possibility of their protruding too far, a set of parts upon which the tolerances might all happen to be on the other side of the established dimension would leave the firing pin not projecting far enough beyond the front face of the bolt, with the result that it would not fire the primer, and the gun would not shoot. Under these circumstances, instead of attempting a further refinement, the course is followed of adjusting the point of the firing pin of each striker to the right length, by a gauge, when the parts are put together in a factory, and of issuing strikers, as spare parts, to the service, which require the same adjustment before use. In order to draw attention to the necessity for this adjustment, and to avoid accident due to the use of a striker whose firing pin might be used without adjustment, a little mushroom head is left upon the point of the firing pin, so that it can not be assembled in the bolt without filing this head off. A gauge is furnished to show what the right amount of filing is. There are other failures of complete interchangeability.

Even with a difference of opinion as to the exact point at which time should cease to be sacrificed for interchangeability, there is scarcely room for doubt that interchangeability is in itself desirable, and I submit that no disadvantage of any moment has come from such delay as has accompanied the realization of the degree of interchangeability which we have in the Enfield rifles, since every soldier armed with these rifles will have had ample time for training and target practice with his piece before he need be sent abroad. Of course, it is desirable, and it certainly is popular, to have rifles and all other equipment ready for soldiers as soon as they are called to the colors; but there is a good deal of training which can be done with rifles of other models than those intended to be ultimately carried, of which the troops in all cantonments have had a very considerable supply, amounting to about 10,000 for each. I append a letter which has been received from the division ordnance officer at one of the National Army cantonments

(O. O. file 354.1/477):

Division Headquarters,
December 15, 1917.

*General William Crozier,
Washington, D. C.*

SIR: In connection with the Congressional inquiry now in progress, I believe some wrong impressions have been created.

I submit some facts which may be of use to you so far as this camp is concerned. I presume the conditions are the same, or nearly the same, at all the other National Army camps.

1. There was no delay in target practice due to lack of Enfield rifles.
2. Target practice has been in progress for over a month with plenty of Enfield rifles and ammunition available.

3. Machine guns (Colt) were received before troops were ready to use them.
4. Automatic rifles (Lewis and Chauchat) were received before troops were ready to use them.
5. Machine gun target practice is being held every day the weather permits.
6. The supply, at this camp, of all kinds of target practice ammunition for both infantry and light artillery is more than ample.
7. In my opinion it is almost certain that the troops will be equipped and trained long before ships are available to transport them overseas.
8. After articles of equipment leave the factory there is delay in transportation. The average daily run per car of freight is around 40 miles—about twice the rate of good infantry marching. This rate I believe is high for peace time, but seems low under present conditions when transportation is supposed to be mobilized for war.

Very respectfully,

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Enough rifles have now been manufactured to fully equip all of the divisions of the National Army, but I can not say today whether the full supply has yet reached the cantonments. The manufacturing capacity is abundant for all of the troops which are likely to be called into the service.

WAR EXPANSION

For years preceding our entry into the present war, my force of ordnance officers was too small, as frequently represented by me, to carry on the duties of the Department, especially in the matter of the design of artillery and artillery ammunition. We were continually hoping to catch up, but, owing to the rapid advance of the art, were continually falling farther and farther behind. It has been necessary to meet the demand for greater ranges than had been considered practicable before the outbreak of the war in Europe, and this and other requirements have made necessary the production of new designs for all types of field and seacoast gun carriages, not only for guns already in existence, but also for guns of new types and new caliber. There has arisen the need for heavy movable artillery on railway mounts, and anti-aircraft artillery on both movable and fixed mounts. As this country has had practically no experienced designers of ordnance except those in the Regular Army and a very small number of private establishments, and as the number of officers in the Ordnance Department has been insufficient to carry on its routine work, the increasing demands for new designs could not be met promptly. A call was made over a year and a half ago upon the only private establishment having any designing force at all, for assistance in getting out two new types of field artillery, both in design and manufacture, but thus far no realization has been had. The advent of war threw on our insufficient force an enormous burden, both in design and procurement, which had to be shouldered at the same time that efforts were made to increase the force by inducting new officers and new draftsmen into the service, and as there were practically no engineers and no draftsmen in the country skilled in the design of artillery, progress in increasing the organization was necessarily slow. Owing to the shortage of the supply, resulting from long years of neglect, the adoption of certain French models, as above described, was decided upon in order to secure the earliest possible equipment. This decision, although greatly accelerating the supply of our forces in Europe with artillery, had an immediate effect of slowing down the placing of orders in this country, since time was required for the receipt of French designs and specifications for both artillery and ammunition, and for the adaptation of these to our own manufacturing methods. Every manufacturer knows how great are the delays involved in such a process, but it was our only alternative from the endurance of still greater delay. The activity of the Ordnance Department in employing the resources of the country has been enormous. The history of what has been done would require a month for preparation. Six large forging establishments for the production of gun forgings, in addition to the two available at the beginning of the war, have been brought into existence, and the same number of large machine shops have been erected and equipped for the manufacture of these forgings into finished guns. The method has been for the Government to finance a going establishment in the provision of the new facilities, these to be then operated by the private management, at Government expense, with allow-

ance for the service. The engagements of these establishments, added to the prospective output of the arsenals, which have also been enlarged, call for upward of 3,000 cannon by the 1st of next July. If the undertaking of our European allies shall be realized, these will nearly all be additional to the number required for our forces in France. I can not be more specific as to calibers and dates of deliveries without disclosing information which should be held confidential, as being of value to the enemy. I quote the following from a letter of December 21, from the French High Commissioner in the United States:

"Even in such remarkable technical conditions as these, it takes time to realize such a program, to organize manufactures and to have men to direct them. You will take less time than we did in France, where the output of big guns was not adequate to our needs before the end of 1916."

Our entry into war brought us in face of a tremendous program for artillery ammunition, and a total of 718 contracts, aggregating a billion dollars, have been placed for this ammunition up to December 15th. The average value covered by each contract is over a million and a quarter dollars. Many of them required troublesome negotiations involving cost of manufacture and compensation, and many of them were delayed because of difficulty in fixing the price of steel. Nine million rounds were ordered in advance of the appropriation of funds for them, which orders were covered by formal contracts after the Act of June 15th. Two hundred thousand rounds of 8-inch shell on June 22d; 600,000 rounds of 4.7-inch shell in the middle of August; 260,000 rounds of 155 mm. shell on July 16th; 200,000 rounds of 8-inch shell on August 9th; 8,000,000 rounds of 75 mm. shell and shrapnel and 1,000,000 rounds of 155 mm. shell and shrapnel on July 12th. These orders absorbed practically all the funds available before the passage of the Act of October 6th.

A comparison may be made of the record of the Ordnance Department in placing contracts with similar work of placing British contracts in the United States; the British Government purchased in the United States a total of about 30,000,000 shell of all sorts, ranging from 13-pdr. to 15-inch. The total cost of these finished shell was approximately \$450,000,000. The British Government began to place orders in the United States about the middle of October, 1914, and continued until about the middle of July, 1917, or nearly three years. The shell purchase extended from February, 1915, to July, 1916, or over a period of 18 months.

The British Government placed in this country orders for ammunition and ordnance of all kinds totaling about \$1,308,000,000, extending from about the middle of August, 1914, until the middle of July, 1917, or over a period of about three years. In comparison with this, the Ordnance Department has placed orders for 63,675,500 shell, of a total value of approximately \$1,000,000,000 between the middle of May and the middle of December, 1917, or over a period of seven months. This total of shell orders is over twice the total purchased by the British in this country in a period of 18 months.

In comparison with the total munitions and ordnance purchases of the British in this country in the period of about 3 years of \$1,308,000,000, the Ordnance Department has placed contracts for a total of \$1,500,000,000 in about 7 months.

The Ordnance Office has averaged 20 contracts a day since our entry into the war, involving a daily average sum of about \$6,000,000. It has accomplished this work while expanding the force of officers from 11 to over 600 in the Ordnance Office, and from 97 to over 2,500 in the entire Ordnance Department, while increasing the force of employees in the Ordnance Office from 96 to 3,000. During this expansion of personnel, it has time and again had to move the office force from one place to another, until it now occupies 13 different buildings in various parts of the city. Certain new divisions of the office have had to be created, such as the Supply Division and a Cost Accounting Division; but the work of setting in motion the factories of the country for the production of war material has in the main been carried on by the divisions of the office as they existed at the beginning of the war. These were: A cannon and ammunition division; a gun carriage division; a small arms division; and an equipment division, in each of which there were sections for designing, purchasing, superintending production and inspecting. Although these divisions have accomplished a very great task, and one which had to be undertaken and pushed at once, it is not surprising that changes and improvements of organization have shown themselves to be

called for to meet the conditions accompanying such a vast work. It is probable that improvement may be effected by segregating the work of engineering design in one division; that of purchase in another, etc., strengthening each division with men of the highest professional and business capacity in civil life. The department has been fortunate in securing already a number of men of this order; civil and mechanical engineers, chemical engineers, managers of department stores and of large mail order houses, bank presidents, skillful lawyers for handling questions of contracts, land purchases, etc.—all of whom have come forward and offered their valuable services, which have been accepted, to such an extent that officers of the regular organization do not now constitute more than 3 per cent of the entire Corps. There is need for still further strengthening in the same manner, and for calling into the Department the most capable production engineers who can be found in the country, in order to see to it that there shall be a minimum of failure upon the part of the tremendous number of manufacturing establishments which have entered into contract relations with the Department, to turn out material which they have taken orders for. All sorts of difficulties will of course be encountered. There will be failure of raw material, of labor, of fuel, of understanding of requirements—all of which will need constant watchfulness in an attempt to cure or forestall them. I do not believe any other manner of doing it can be found so good as that of strengthening, by the proper personnel, the organization which understands the requirements. Accompanying the enlargement of the organization, there should be a removal of every possible restriction tending to hamper initiative. Checks and safeguards, which are appropriate in normal times, must be sacrificed when great haste is required, which can only be secured through individual authority, and the risks hazarded and mistakes made must be accepted as the price of the celerity which we can not forego. Inquiry should follow, rather than precede, action; and nobody should be compelled to wait for authority to go ahead upon a line whose proper direction is clearly visible.

Gaylord Bros.

Makers

Syracuse, N. Y.

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